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ABSTRACT

This is a resource guide (in response to the New York City water emergency) for grades K-12 on the subject of water conservation. Activities are suggested for science, industrial arts, social studies, and communications arts classes. A bibliography on water is also provided. (APM)

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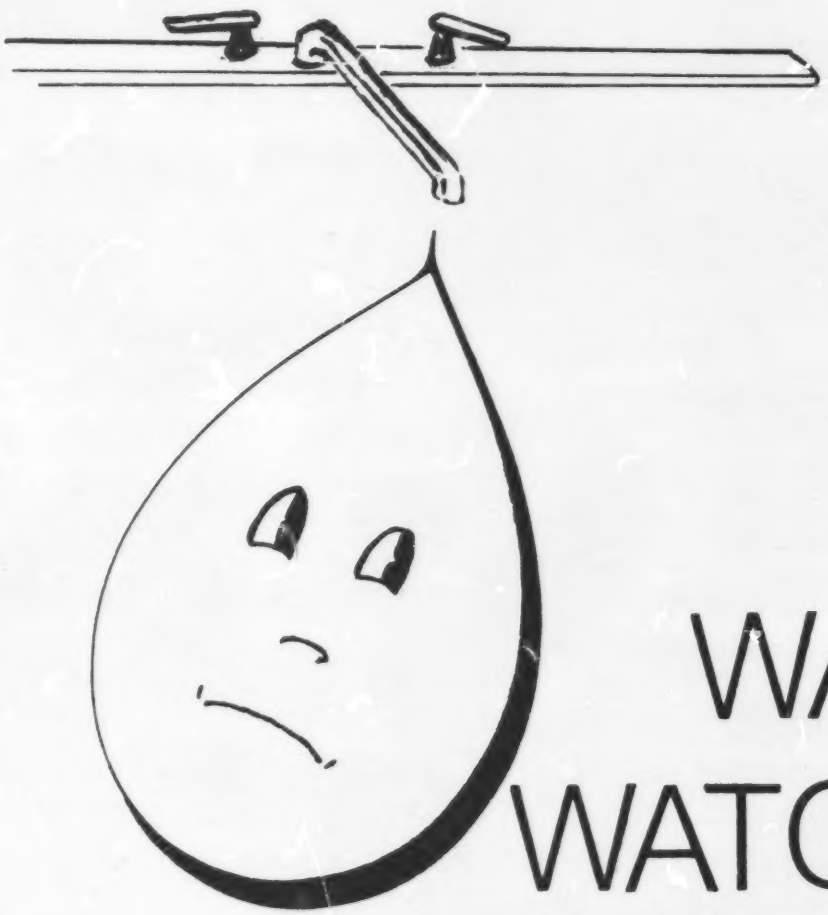

BE A WATER WATCHER

A RESOURCE GUIDE FOR WATER CONSERVATION

K – 12

U.S. DEPARTMENT OF EDUCATION
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New York City Board of Education

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A MESSAGE FROM THE CHANCELLOR

New York City is currently in a drought emergency, declared by the Mayor on January 19, 1981. All residents of the city have been called upon to engage in conservation efforts aimed at safeguarding our precious, but dwindling, water supply. We must pledge ourselves as private citizens, as professional educators, and as students to support the citywide water conservation effort.

As educators, we can bring this important message to our students by infusing water conservation lessons and activities into the curriculum at all levels. Be A Water Watcher has been developed to provide teachers and supervisors with a guide for accomplishing this task. Let us all join in this important effort to protect and conserve our most vital natural resource.

Frank J. Macchiarola
Chancellor of Schools

FOREWORD

As individuals and as a society, we are totally dependent upon water. Every day, 700 billion gallons are used in the United States. Each of us uses about 100 gallons a day for washing, drinking, cooking, and other everyday activities. A large tree may absorb more than 1,000 gallons on a hot day. It takes 115 gallons of water to grow enough wheat for one loaf of bread. Water is vital to industry, where billions of gallons are used every day not only to manufacture products, but also to cool down machinery. While people can live for about 40 days without food, they can survive for only 4 or 5 days without water.

Water, a most precious commodity, is often taken for granted. It is usually so freely available to us that we do not give it a second thought. When we need water, we turn on the tap. Will it always be there?

During the summer of 1980 there was not sufficient water pressure in some parts of the city to fight fires. We have had so little rain this year that our reservoirs are at dangerously low levels. In short, we are living through a water emergency.

We need to plan now for the coming summer when our water needs will be exceptionally high. Because it is estimated that our rain and snowfall this winter will not be adequate to cover our needs, it is incumbent upon us to help guide our students and their families to a heightened awareness of this critical problem and to stress the importance of water conservation.

Almost any classroom is an appropriate forum for the discussion of these problems. In every grade from kindergarten through grade twelve, we must make a special effort to infuse water conservation teaching into classroom instruction. To be sure, this subject is treated in various curriculum bulletins. (See attached.) Because of the critical nature of the problem, however, administrators, supervisors, and teachers may wish to expand their treatment of this subject. To this end, some model lesson plans have been prepared which can be adapted according to the needs and abilities of students.

Charlotte Frank

Charlotte Frank
Executive Director
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Elementary
Model Lesson

MOTIVATION

Show pictures of people doing various jobs that require water, e.g., washing car, washing dishes, drinking, shaving, fire fighting, etc. Ask "What do these people have in common?"

AIM

Why is water important to us?

SUGGESTED ACTIVITIES

- List all the ways your family used water this week. Include pets, plants, cooking, clearning, etc.
- Collect pictures of people using water. Create a bulletin board display focusing on the importance of water in our lives.
- Write a class composition on the importance of water.
- Discuss: How do some people waste water? What might happen if we run out of water?

SUMMARY

- Discuss the phrase: "Be a water watcher." Why is it important to be a water watcher?
- How can we help save water in our own homes?

Elementary
Model Lesson

MOTIVATION

You have been appointed deputy mayor in charge of saving water. What are some of the ways you can influence people to conserve water?

AIM

How can we write a slogan to promote water conservation?

PIVOTAL QUESTIONS

- Define "slogan."
- Give examples of some slogans you have heard, e.g., "I love New York," "Don't dump on New York," "It's a matter of life and breath," "The life you save may be your own."
- What are the qualities of a good slogan? (short, catchy, clear message)
- In small groups, develop some slogans for water conservation.
- Draw posters to illustrate each slogan and then create a bulletin board display focusing on water conservation.

SUGGESTED CLASSROOM ACTIVITIES

1. Distribute rexographed copies of the "water report card." After reviewing the items, instruct students to complete it at home with the help of parents. Reports cards should be returned the next day, and a class tally made. Follow-up discussion: How Can you improve your grades?

WATER REPORT CARD

	YES	NO
Do you have dripping faucets in your house?	____	____
Do you let the water run while brushing your teeth?	____	____
Do you take baths rather than showers?	____	____
Do you leave faucets running when they are not being used?	____	____
Do your parents wash the car more than once a month?	____	____
Does your father or brother leave the faucet running while shaving?	____	____
Do your parents water their lawn or garden every day?	____	____

2. Using pictures and diagrams, discuss how water gets from a reservoir to our homes.

3. Make posters advising people on ways to save water.

4. Conduct an assembly program which focuses on water, its importance, uses, and ways to conserve.

5. Review the concept of volume and how it is measured. Practice converting from standard to metric units, e.g., from gallons to litres. The amount of water needed for everyday activities can be used in this exercise (see resource section for a chart).

MOTIVATION

In medieval Europe water demand was only 3 - 5 gallons per day per person. Approximately how much water does each of us use each day? Why has our water consumption increased?

AIM

Why is it important to control our water consumption?

PIVOTAL QUESTIONS

. It is estimated that we use about 100 gallons each day per person. What daily activities require water?

. How much do we use for each of these activities? How can we reduce each of these amounts? How much can they be reduced?

. Devise a way of calculating the daily water loss from a leaky faucet. (Hint: Use a stopwatch and calibrated container.) Try the method at home and report your results.

. Which season probably creates the highest demand for water? Why? Why is this a source of concern for New York City officials?

. Where does New York City water come from? Where is it stored? How does it reach the city?

. Compare the reservoir levels today with those of a year ago.

SUMMARY

How can we help in the New York City water conservation effort?

SUGGESTED CLASSROOM ACTIVITIES*

1. Diagram the water cycle.

2. Identify the factors which may contribute to a water shortage, e.g., supply vs. demand, pollution, inadequate distribution systems, etc.

3. Review techniques for measuring volume. Determine the volume of a classroom in cubic feet. Calculate the amount of water that would be needed to fill a classroom (1 cu. ft.$\approx$7.5 gal.) At the rate of use of 100 gal/day/person, how long would the supply in the room last?

4. Using a map, locate the three watershed areas (Croton, Delaware and Catskill systems) that we use. Identify the topographical characteristics of these areas. Discuss the importance of forest management to these areas.

5. Research industrial uses of water, e.g., cooling machinery, chemical production, refrigeration, etc.

*Many activities and lessons are to be found in the science curriculum bulletins. Consult the resource section of this guide for full references.

MOTIVATION

Read these headlines recently appearing in New York City newspapers:

- City Implementing Program To Reduce Water Leak Loss
- Water Rationing Due In A Few Weeks
- City Needs 60 Days of Snow Or Rainfall To Fill Reservoirs

Discuss: Why are headlines such as these becoming a common sight in our newspapers?

AIM

How will a water shortage affect our daily lives?

PIVOTAL QUESTIONS

. Why are we experiencing a water shortage?

. How have citizens added to the problem?

. How much water does the average person use each day? For which activities is it used?

. How would your life change if you had to use 75% less water than you do now?

. Divide the class into small groups. Give each group the following task. "You are a special committee appointed by the mayor to draft a plan of action for citywide water conservation. Develop a plan and be ready to present it to the mayor in 20 minutes." After the groups are finished, each should make a brief presentation to the class.

SUMMARY

What can each of us do at home and at school to save water?

SUGGESTED CLASSROOM ACTIVITIES

1. Debate the following "solutions" to the water shortage:

   - Make people pay for their water, like electricity
   - Turn off the water periodically each day
   - Heavily fine anyone using a car wash
   - Issue water ration coupons and dispense water from a central location in the city.

2. Discuss the impact of a serious water shortage on democracy. Try to determine how the scarcity of an essential resource affects the politics of a region. What effect does it have on the distribution of power in a community, and how does power influence what solutions are used to control a shortage. For example: With limited resources, who decides how to use the water we have. How is the decision arrived at? How is it implemented? Can "panic" during a shortage lead to a facist-like government with repressive police action? By discussing these topics, students see that water shortage, besides having enormous direct effects on lifestyle, may also have impact on freedom and the political rights of citizens.

3. As a class develop a water conservation campaign for your school. Include art work, public address announcements, and neighborhood outreach work. **NOTE: Classes may wish to work with members of the general organization to implement the program. At the high school level, student leadership classes would become involved in the project.

4. Have students act out the following skit. The class should then discuss the following questions:

    1. According to this story, why does New York City become a ghost town?
    2. Who is to blame for the situation described?
    3. How could the situation have been avoided?

Make believe a group is riding on a spaceship in the year 3001 A.D.:

Tour Guide: (Speaking into a microphone) And now we are entering another old ghost town where our forefathers dwelled and once prospered.

Tourist #1: Was there once a nuclear war here...I mean, so many buildings look burned out?

Guide: No, no war. Just fires. What you see in many cases here are the charred remains.

Tourist #2: But surely even in the year 1980 they must have had firefighting knowledge. Couldn't this have been prevented?

Guide: They have a fire department and equipment, crude as it was back then, but the main item - water - was in short supply.

Tourist #3: How could the supply get so low that a whole town vitually burned down?

Guide: Methods of controlling and inducing rain were primitive twenty years ago. They had to depend on the graces of nature. During drier periods, water conservation was needed and without it, they perished. People had to move to more rain-rich areas - scarce as those were - and what was left rotted or burned.

Tourist #4: What alternatives did they have?

Guide: They could have listened to the early warnings of officials about low water levels in reservoirs and stopped wasting the precious liquid. They could have fixed leaky faucets in their homes; they could have taken showers instead of baths; they could have refrained from washing cars and watering lawns or running a washing machine that's only half full. They didn't bother. They thought the problem wasn't serious and would go away by itself.

As they were leaving the guide and the tourist noticed a sign on the ground which said, "42nd Street-Times Square."

SUGGESTED CLASSROOM ACTIVITIES

1. Write and deliver a persuasive speech, urging people to conserve water.

2. Write a newspaper article which describes steps that everyone can take to save water.

3. With an art class: Team up with an art class to save water. Develop some campaign slogans for water conservation and ask an art class to make poster illustrating them. Write a business letter to a local bank, post office, or library, requesting that the posters and art work be displayed.

4. Write a short story about what life in New York City would be like ten years from now if the water emergency continues.

5. Write a report on how we use water and how we waste water.

6. Using the news articles in the resource section of this guide, delete key words from some of the passage. Have students supply missing key words. Follow up with a class discussion regarding why students selected the words they did.

SUGGESTED CLASSROOM ACTIVITIES

1. Present lessons on the use of water saving devices for the home, e.g., flow restriction washer for shower head (made out of either metal or plastic).

2. Students check for leaks in every area of the home using water including kitchen, bathroom, boiler room, and laundry room.

3. Demonstrate water saving tips to students; procedures for washing and cleaning, etc.

4. Industrial Arts Office should receive suggestions from the field for dissemination to the Industrial Arts shops - city-wide.

For Specific Shop Areas

A. Ceramics:

   1. Wash clay off tools in a basin, not under running water.

   2. Rinse hands in catch basin to remove clay, then wash hands under faucet.

B. Transportation:

   Do not wash cars in school.

C. Graphic Arts:

   Informative posters, signs and other materials will be printed for distribution to the school and home.

School Facilities

No tampering with automatic faucet shut-off devices.

RESOURCES

WATER USE IN DAILY ACTIVITIES

ACTIVITY	IN NORMAL HOUSEHOLD		IN CONSERVATION MINDED HOUSEHOLD	
Shower		25 gal	wet down, soap up, rinse off	4 gal.
Brushing teeth	tap running	10 gal	wet brush, rinse briefly	½ gal
Tub bath	full tub	36 gal	low water level	10 gal
Toilet flush		5 - 7 gal	with tank displacement (plastic bottle filled with water)	4 gal
Dishwashing	tap running	10-30 gal	use dish pan	5 gal
	dishwasher - full cycle	16 gal	dishwasher - short cycle	7 gal
Shaving	tap running	20 gal	basin of water	1 gal
Handwashing	tap running	2 gal	basin of water	1 gal
Clothes washing	full cycle	60 gal	short cycle	27 gal
Lawn watering or car washing at home		10 gal/min		

TEACHING ABOUT WATER - REFERENCES APPEARING IN MINIMUM TEACHING ESSENTIALS

GRADE	TOPIC	PAGE
Kindergarten	Characteristics of Water	114, 115
	Changes In Foods	115
1	Floating And Sinking	136-137
2	Water In The Environment	160
3	Rain, Snow, Water Vapor	194
4	The Water We Use	222
5	Evaporation And Condensation	242
	Climate And Oceans	244
	Flowing Water	245-246
6	Interactions In The Environment	276
	Energy And Water	277
	Water Pollution	278
7	Needs Of Living Things	298-299
8	Forming Solutions With Water	329
	Floating And Sinking	333
	Water In The Atmosphere	335
9	Astronauts And Water	369

TEACHING ABOUT WATER - LESSONS APPEARING IN EXPERIMENTAL CURRICULUM BULLETINS

Investigating Our Environment: Science Grade 6

Aim: How Can We Increase The Usable Water Supply? Pg. 214-215

Environmental Science Grade 9

Aim: What Effect Does Urban Development Have On The Water Supply? Pp. 215-216

Aim: Why Is Some Water Not Fit For Use? Pp. 320-321

Aim: What's Being Done To Clean Up Water? Pp. 333

TEACHING ABOUT WATER - LESSONS APPEARING IN STANDARD SCIENCE CURRICULUM GUIDES

GRADE	TOPIC	PAGE
Kindergarten	Getting Wet And Drying	75-79
	Water Mixes With Foods	84-89
1	Wind Effects On Water	114-115
	A Rainy Day	120-123
	A Cold Day	124-128
	A Snowy Day	128-132
	Floating Along	162-168
2	Water Around Us	211-221
3	The Needs of Plants	54-57
	Rain, Snow And Water Vapor	106-112
4	Weather (Water)	244-250
	The Water We Use (Reservoirs)	106-112
5	Distillation; Filtration	27-28
	Water And The Environment	71-75
	Rainfall and Climate	111-113
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	Flowing Water	163-171
6	Water Pollution	71-72
	Water Molecules	128-131
	H_2O	141
7	Life In Pond Water	167
8	Man In Space (Water Needs)	203

The following text is reprinted, by permission, from "Water: Uses And Abuses" printed by the Gateway National Recreation Area.

An open water hydrant, a hot bath, cold lemonade—all these take water. We think that there is an endless supply; we take water for granted.

New York City gets its fresh water from three big watersheds far to the north of the city. Rainwater collected from the streams and rivers comes to the city through enormous pipes.

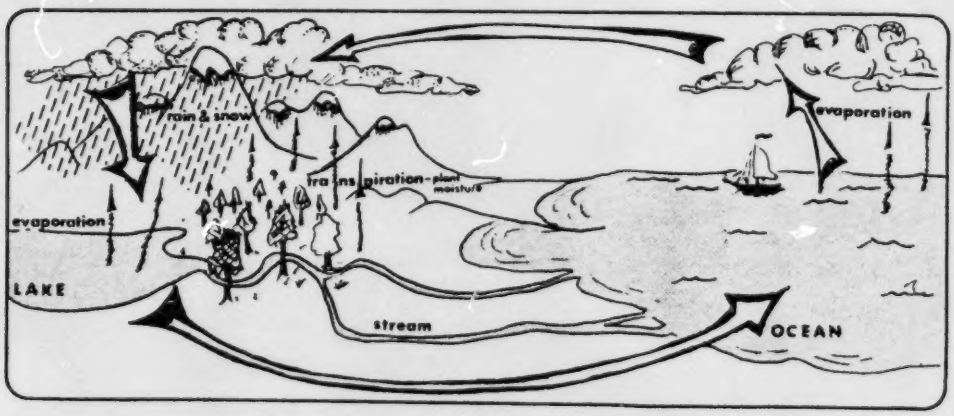
What happens to it when it arrives in town? We drink some, we use some in manufacturing and food processing. Most, however, is used to flush away our waste products.

We use up to seven gallons every time we flush the toilet; up to 35 gallons for a five minute shower, and up to 20 gallons to wash the dishes. Each day, each of us, converts, directly or indirectly, over 100 gallons of pure water into sewage. This figure means that every day New York City produces over one billion gallons of sewage—enough to fill Yankee Stadium seven times over.

But the supply of water is not endless. The total amount on earth is limited. It is involved in a cycle driven by the heat of the sun. Water evaporates from the oceans and bays, condenses in the form of clouds and falls back to earth again as rain or snow.

After we use it, the water goes back into our waterways, so the same water is used over and over again. Your next soft drink could contain water that was once in Cleopatra's bath

What happens to waste water after it leaves our homes? It flows first to small collection sewers under our streets and then into bigger and bigger pipes, much like an underground river system. Most of these carry sewage to one of the city's sewage plants, one of which can treat more than 300 million gallons a day, removing many of the pollutants.



Once all kinds of fish, clams and crabs could easily be caught in our estuaries—where sea water meets fresh river water—and were used for food by everyone. Swimming was possible without danger to your health. As the area prospered, the number of people who lived here grew and grew. Raw sewage was dumped into the water in increasing amounts. As industry expanded, the creatures living in the water were affected by the chemicals dumped by factories and by oil spilled into the water, and run-off from our streets. By 1916, the shellfish business—clams and oysters—in the Lower Bay was closed by public health officials because of contamination. It became hazardous to swim in many of our rivers and harbors.

Since the 1930's New York City has had a continuing program to improve the treatment of wastes in used water, but during the past few years efforts to purify our water have become even more important to the public, which is now better educated in the environment and ecology.

Treatment plants use living bacteria to help purify the waste water. Before pouring the treated water back into the waterways many of the harmful bacteria are killed by the addition of chlorine.

Nearly all the water we use ends up in the harbor. Some of the waste water does not even go through treatment plants but is dumped "raw" into the Hudson River. Changes are being made to try to solve this problem. New treatment plants are being developed and built, and existing ones are being improved.

There is another source of water problems for our area—rain and snow. Of course, we need rain, and should be glad to get it. But because most of our cities are paved or covered with buildings this water runs off almost immediately. To transport it we have storm sewers along the edges of our streets. Unfortunately these connect directly to the rest of our sewer system, so that rainwater and house sewage share the same pipes. When it rains very hard the capacity of our sewage treatment plants is insufficient to handle all the extra water at once—so the "raw" sewage and the rainwater are then poured directly into our rivers and into the harbor.

In an attempt to solve this problem, New York built an experimental treatment plant at Spring Creek which can store large amounts of run-off from storms so that it can be processed later.

Run-off from rain carries eroded soil and dirt and chemicals from the streets which add to the pollution problem.

As citizens each of us has a stake in cleaning up our waterways. We can have more and better beaches, better boating and better fishing. The problems are not simple, and there is much we need to learn. Citizens, however, can affect the cleanup of the waters of our estuary—by talking and writing to their elected representatives, by joining groups which work to make possible new recreational use of the waterways, and by their individual actions.

Pollution by solid waste is also a problem in our waterways. The U.S. Army Corps of Engineers has a program to clean the water of timbers that break loose from rotting docks and old sunken ships. Dumping of garbage in the water is prohibited.

Remember, if you throw a tin can or a candy wrapper overboard it is likely to end up as waste pollution on one of our beaches—that is to say, *your* beaches.

Gateway National Recreation Area is grateful to Mr. Raymond Pfortner of the U.S. Environmental Protection Agency for providing the manuscript upon which this folder is based.

ELEMENTARY SCHOOL ASSEMBLY PROGRAMS

Some schools may wish to conduct assembly programs focusing on the theme of water conservation. The program may include songs, skits, and poetry or essay readings. The following material was presented at an assembly program at P.S. 124M on January 26, 1981 to officially inaugurate the New York City Public School's water conservation campaign. Our thanks to Principal Samuel Cooper, the staff and the students of P.S. 124M for providing us with this material.

ORIGINAL SKIT*

A Man Called Oscar, the Water Waster

Announcer: Dear friends, Class 5-1 is proud to present an original skit on water conservation, A Man Called Oscar the Water Waster.

Scene 1

Narrator: Oscar retires for the night leaving the water faucet open and the dishwasher on with only 2 dishes inside. (Suddenly an unexpected visitor appears.)

Oscar: Bah, waterbug! I left the water faucet and the dishwasher on. Oh! Who cares!

Sam (Ghost No. 1): Oscar, Oscar Mortimer? Why are you wasting all that water?

Oscar: Who's that? (Shaking.)

Sam: I'm your old friend, Sam.

Oscar: (Wheels around quickly.) Sam, is that really you? You're alive! You've been dead for seven years.

Sam: Why did you keep the water faucet on and the dishwasher running?

Oscar: Bah, waterbug! Sam. There's plenty of water in New York City.

Sam: There is water, but the supply is dwindling because of water wasters like you. Come with me into the past and I'll show you how foolishly you've wasted water.

Scene 2

Sam: Do you remember Oscar? Look!

Oscar (as child): (Laughs aloud. Little Oscar turns the faucet on full blast.) Oh, this will make a great swimming pool.

Sam: Look closely, Oscar.

Oscar: Can it be? Yes, that little boy is me! Me! Now I remember the time I tried to make a swimming pool in the basement. Boy, was that funny...

Sam: Funny? Many New Yorkers wouldn't agree that wasting water is funny.

Oscar: Bah, waterbug! I keep telling you there's plenty of water in New York City.

Sam: Oscar, not so. Come with me to see some of your friends and you'll see differently. (EXIT)

* Presented by Class 5-1, Teacher: Mrs. A. Goodstein

Scene 3

Oscar: Where are we?

Sam: The year is 1987.

Oscar: Why, that's my friend, Felix. What's happened to him?

Sam: Look closer, Oscar.

Oscar: Felix, you're filthy! You used to take 5 showers a day. Now, your hair is dirty. Your clothes are filthy, and, bah waterbug, your kitchen floor's a mess.

Felix: Oscar, I'm miserable. We have so little water left that I can hardly take showers, and you know I'm only happy when I'm clean.

Oscar: No, no more, I feel guilty enough.

Sam: Dear friends (faces audience), what will happen to our water supply when water wasters like you are around?

Oscar: My friend, Felix, he was so clean. Now look at him - his clothes are dirty, his kitchen floor is dirty. What's happening?

Sam: All the people in New York City are looking for water for cleaning, bathing, cooking, drinking and washing. They have none because people like you carelessly and selfishly used it up.

Oscar: What can I do? Is it too late?

Sam: It's never too late. You and all New Yorkers have to be creative and think of ways to save water.

Oscar: (Gestures to audience.) C'mon everyone. Let's think of ways we can conserve water in our homes.

(Four children come up.)

1. Use the dishwasher and washing machine only when there is a full load.

2. Take showers, not baths. Conserve water.

3. Keep all faucets tightly shut.

4. Only use water when absolutely necessary.

5. Remember! Everyone! Keep New York City Wet (Cheerleaders).

SONG - TOMORROW*

We need some water for tomorrow,

So you've got to keep it for tomorrow.

Come what may.

When you're stuck with a year that's dry, and dirty,

You've got none to blame

So save, today ----------

Tomorrow, tomorrow, there'll be enough water,

If we can conserve today.

*Song to the tune of "Tomorrow" from the broadway show "Annie."
Words by Class 5-1, P.S. 124M, Teacher: Mrs. A. Goodstein.

The following questions were asked by Mayor Edward I. Koch during a question and answer period with students at P.S. 124M on January 26, 1981.

Q. If dishes are washed in a basin, not under the tap, how much do you save?

A. 7½ gallons.

Q. How do you rinse off your toothbrush?

A. In a glass - save 3 gallons.

Q. What should you do with leaky faucets?

A. Fix them.

Q. How should daddy shave?

A. With a half-full sink - save 3 gallons.

Q. How long should mommy be in the shower?

A. Three minutes - save 4-6 gallons.

Q. What's better, a shower or bath?

A. Shower uses less water.

Q. How full should the tub be when you bathe?

A. Half full - save 10 gallons.

BONUS QUESTION: What number do you call to report an open hydrant?

A. 966-7500.

LAST QUESTION: Any other ideas on how to save water?

Select kids up front.

The following oath was used by the Mayor to deputize all New York City school children as Deputy Mayors in-Charge-of Saving Water on January 26, 1981.

"I promise to faithfully fulfill my job as Deputy Mayor
in-Charge-of Saving Water
I will conserve water in my home, school and neighborhood.
I will encourage my family and friends to do the same.
I will keep New York wet."

The following poems were written by Class 6-1 of P.S. 124M, Ms. F. Bochinis, teacher. The students reading in an assembly program were Mee Ling, Marie Wong, Stacey Chu, Garmon Ng, and Susan Lau.

CONSERVE WATER

Water provides many needs,
To save water is one of our most important deeds.
Water doesn't come from the sun,
So don't waste it before it's gone!

Don't sit back and watch the water run,
Don't think it's a lot of fun.
If we all take a gigantic part,
We'll have a happy feeling in our hearts!

Water is an important source,
So you have to save it, of course.
We need to save the water badly,
Or we'll live very sadly!

People that waste water are fools,
So don't be like that, too.
If you don't save water you will regret it,
And in the future you will not forget it.

Conserving water is important to us,
You don't put a minus - you put in a plus.
We all have to dig in for a solution,
So lay back and think for a satisfying conclusion!

WHERE DID ALL THE WATER GO?

Where did all the water go?
It went when the wind blew.
It was a very bad thing to know,
When all the water had to go!

A drop, A drop,
Is so important to the crops.
Life will get tougher,
And we'll have to suffer!

The sun took the water and never gave it back,
Now it's like looking for a needle in a haystack.
We will regret it for the rest of our lives,
Because we didn't conserve it right!

The water was something we all need,
We use it to feed the appleseed.
The water has gone up into the sky,
Now that it's gone, I want to cry!

The water disappeared on a drastic day,
When everyone wished that it would stay.
We all know it won't be back,
And that was this and this was that!

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